Arrastra Basin Characterization and Decisions

Biological and Water Quality have been characterized throughout Arrastra basin including extensive sampling during the late 1990's and early 2000's. While early water quality sample events were covered under the Lower Animas SAP, later sampling and characterization events utilized the Sampling and Analysis Plan for Arrastra Creek Characterization, San Juan County, Colorado, June, 2002. Summaries of the results of these projects are included in the *Final Report, Segment 3C Characterization Project, Arrastra Basin,*WQC02000019 of. August 31, 2004 and the *Macroinvertebrate Survey of Arrastra Creek,* 2002, by BUGS Consultants.

RECENT HISTORY

The Animas River and many of its tributaries above Silverton carry high concentrations of metals from both mining and natural sources. The ASRG and its member entities have undertaken extensive sampling to characterize the water quality of the mine wastes, draining adits, and streams throughout the upper Animas Basin. This information and site by site feasibility studies used to determine the potentials for remediation of priority mine sites have been combined into the Animas Use Attainability Analysis of 2001. That same year, the WQCC adopted goal based stream standards (including site specific numeric standards based upon ARSG remediation projections made in the UAA

However, during the 2001 Rulemaking Hearing for stream standards on the Animas River it was recognized that Arrastra Creek (Segment 3c) and Animas River from Eureka to Silverton (Segment 3a) needed further characterization before the factors limiting aquatic life and the adoption of appropriate numeric standards could determined. In 2001 the Commission had adopted temporary numeric standards for two metals (Cu and Zn) that were found to exceed TVS in Arrastra Creek (those standards expired in 2006). In December of 2001 San Juan RC&D applied for and received a NPS 319 grant to complete the characterization of Arrastra basin. The Arrastra SAP was approved in June, 2002 and sampling and analyses were completed and results reported on August 31, 2004 (Segment 3C Characterization Project WQC02000019).

Identify the Decisions to be Made

The purpose of this step is to define the decision statements (DSs) this study will attempt to resolve. DSs are developed by combining principal study questions (PSQs) and alternative actions (AAs) or estimation statements (ES). Assessing the risk that site related contaminants pose to ecological receptors relies on multiple lines of evidence. Specific AAs are anticipated based upon previous sample and characterization results.

Data collected from the sampling events will be incorporated into the decision making process for determining the extent of metals loading and impacts to aquatic life in Arrastra Creek and Segment 3a of the Animas River. The principle study questions (PSQ's) are as follows:

PSQ1 - What is the seasonal and annual variability in water chemistry, metals loads, and discharges from Arrastra Creek?

PSQ2: Are there additional identifiable and quantifiable sources of metal loading impacting Arrastra Creek and the Animas River that were previously missed?

PSQ3: Is there any practical way to identify and quantify sources of metal loading to Silver Lake other than sampling surface water and seeps into Silver Lake?

PSQ4 - Can Arrastra Creek water quality data be used to quantify impacts to the Animas River?

PSQ5: If metal sources were identified and their extent estimated, is there any practical method of remediation of these sources.

PSQ6-What are the historic and cultural values present in Arrastra Basin, there importance, and there relationship to potential remediation activities?

PSQ7 – Would remediation of any identifiable metal source be practical and result in improved aquatic life in Arrastra Creek or the Animas River?

PSQ8 - Can these data support stakeholder input and decisions on the future design of remedial actions within Arrastra basin or elsewhere in the Upper Animas Watershed?

Estimation Statements

Principle Study Question 1: What is the seasonal and annual variability in water chemistry, metals loads, and discharges from Arrastra Creek? Has the condition changed since 2004?

Principle Study Question 2: Are there additional identifiable and quantifiable sources of metal loading impacting Arrastra Creek and the Animas River that were previously missed?

Principle Study Question 3: Is there any practical way to identify and quantify sources of metal loading to Silver Lake other than sampling surface water and seeps into Silver Lake? Or

Estimation of leaching potential from tailings and mine wastes surrounding Silver Lake should be considered. Waste samples taken could be subjected to leach testing. .

Principle Study Question 4: PSQ5 - Can Arrastra Creek water quality data be used to quantify impacts to the Animas River?

We would determine if and when Arrastra Creek discharge improves or further worsens aquatic life conditions in the Animas River. Previous samples will be analyzed to determine which metals exceed Table Value Standards in Arrastra Creek, <u>when</u>, and how their concentrations compare to the non-compliant metal concentrations in Segment 3A..

Principle Study Question 5: If additional metal sources are identified and their extent estimated, is there any practical method of remediation of these sources?

Due to the remote and poor access to the Upper Arrastra area, which includes Silver Lake and its adjacent mines, mills, and historic structures, cost effectiveness of any remediation activities should be evaluated and compared to remediation potentials in other basins that might be more beneficial to the health of the Animas River.

Principle Study Question 6-What are the historic and cultural values present in Arrastra Basin, their importance, and their relationship to potential remediation activities?

Perhaps a photo journal of all historic sites should be developed during the course of this exercise. San Juan County Historical Society, the Board of County Commissioners, and the Colorado State Historical Society should be consulted and their positions and priorities for the preservation of historical structures, artifacts, and cultural features need to be considered. Remediation activities must consider historical factors that could increase costs, reduce effectiveness, or inhibit such activities altogether.

Principle Study Question 7 – Would remediation of any identifiable metal source be practical and result in improved <u>aquatic life</u> in Silver Lake, Arrastra Creek or the Animas River?

Fish (trout) habitat is minimal or non-existent throughout Arrastra. This needs to be confirmed by the Fish Biologist for the Colorado Department of Parks and Wildlife. Although Cd, Cu, Mn, and Zn concentrations exceed TVS in Segment A of the Animas it maintains a healthy brook trout population. Yet metal concentrations in Segment C are generally lower that those found in Segment 3a. The hardness is much lower in segment c. What improvements to aquatic life, if any, can be expected through remediation?

PSQ8 - Can these data support stakeholder input and decisions on the future design of remedial actions within Arrastra basin or elsewhere in the Upper Animas Watershed?

If these data are sufficient to support stakeholder input and decisions on cost effective remediation, then a remediation plan should be developed. If data is insufficient to support such a plan, then additional data should be identified and this plan could be amended to do further sampling. The limited resources available for remediation should be utilized where they are

most cost effective for reducing metal concentrations in downstream waters and improvements to aquatic life. If it is apparent that remediation in other locations within the Upper Animas Watershed would have superior effectiveness than remediation within Arrastra basin, a position statement should summarize this finding and perhaps a plan should be developed to accomplish that remediation.